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WHAT IS CLAIMED IS:

1. A method of treating a surface of tubular article, the method comprising the steps of:

    generating a gaseous plasma within a spatially-localized region of space by electron cyclotron resonance, and

    exposing at least a portion of a surface of the tubular article to said plasma for a selected time period to treat the surface.

2. The method of claim 1, wherein said surface is selected to be at least a portion of the lumen of the tubular article.

3. The method of claim 1, wherein said surface is selected to be an outer surface of the tubular article.

4. The method of claim 1, wherein the step of generating the gaseous plasma includes

    providing a magnetic field having a selected strength within said region of space, and

    irradiating a gas contained within or flowing through said region of space with electromagnetic radiation having a frequency substantially equal to electron cyclotron frequency at said magnetic field strength so as to ionize the gas and produce said gaseous plasma.

5. The method of claim 4, further comprising the step of selecting a pressure of said gas to be in a range of about 0.1 Pa to about 1000 Pa.

6. The method of claim 5, further comprising selecting the gas pressure to be in a range of about 1 Pa to about 10 Pa.

7. The method of claim 6, further comprising selecting the gas pressure to be approximately 5 Pa.

8. The method of claim 4, wherein the frequency of the electromagnetic radiation (f_c) and the magnetic field amplitude (B) approximately satisfy the following equation:

$$f_c = \frac{1}{2\pi} eB/m$$

wherein e and m are the charge and mass of an electron, respectively.

9. The method of claim 4, wherein a ratio of the frequency of the electromagnetic radiation in units of Hertz and the magnetic field amplitude in units of Gauss is approximately 2.8×10^6.

10. The method of claim 8, further comprising selecting the radiation frequency to be in a range of about 1 GHz to about 15 GHz.

11. The method of claim 10, further comprising selecting the amplitude of the magnetic field to be in a range of approximately 300 Gauss to 5500 Gauss.

12. The method of claim 4, further comprising selecting a power level of the electromagnetic radiation to be in a range of 10 to 500 Watts.

13. The method of claim 12, further comprising selecting the power level to be in a range of about 75 Watts to about 150 Watts.

14. The method of claim 13, further comprising selecting the power level to be approximately 100 Watts

15. The method of claim 2, further comprising the step of selecting an inner diameter of said tubular article to be in a range of about 0.5 mm to about 20 mm.

16. The method of claim 1, further comprising the step of drawing said tubular article through said region of space so as to expose different portions of the tubular surface to said plasma.

17. The method of claim 16, further comprising selecting a uniform speed for drawing said tubular article so as to provide a substantially uniform treatment of selected portions of the surface of the tubular article.

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18. The method of claim 17, further comprising selecting a non-uniform speed for drawing said tubular article so as to effect a graded treatment of selected portions of the surface of the tubular article.

19. The method of claim 1, wherein said tubing is formed from the group consisting of electrically non-conductive organic polymer, and electrically non-conductive glass.

20. The method of claim 1, further comprising the step of coating said treated surface with a selected material.

21. The method of claim 20, wherein said coating material is selected to from the group consisting of an organic polymer, an inorganic material, and a bioactive material.

22. The method of claim 20, wherein said coating material is selected to be any of anti-thrombogenic, anti-coagulant, anti-biotic or anti-microbial.

23. The method of claim 20, wherein said anti-coagulant material is selected to be heparin.

24. The method of claim 20, wherein said coating material is selected to include any of one or more proteins, one or more vitamins, one or more minerals, or one or more enzymes.

25. The method of claim 20, wherein said coating material is selected to have anti-inflammatory analgesic properties.

26. The method of claim 20, wherein said coating material is selected to have cell growth properties.

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27. The method of claim 4, further comprising selecting the gas from the group consisting of noble gases, diatomic gases, hydrocarbons, and fluorinated hydrocarbons.

28. The method of claim 27, wherein the gas can be selected to be any of argon, oxygen, nitrogen, methane, butane, and tetrafluoromethane.

29. The method of claim 4, further comprising selecting the gas such that said gaseous plasma effects direct deposition of a selected material from the plasma onto the surface of the tubular article.

30. The method of claim 29, wherein said gas is selected to be any of hydrocarbon or fluorinated hydrocarbon and said deposited material includes carbon as at least one constituent.

31. The method of claim 3, wherein the exposure of the outer surface to the plasma effects any of smoothing, sealing, reducing friction, sterilizing, or bond scission of the surface.

32. The method of claim 2, wherein the exposure of the portion of the lumen to the plasma effects any of smoothing, sealing, reducing friction, sterilizing, or bond scission of the lumen.

33. A method of treating a wall of a lumen, comprising the steps of:

placing a selected portion of said lumen in a treatment zone,

applying a magnetic field having a selected strength to the treatment zone,

introducing a gas into said lumen within said selected portion, said gas being in contact with the wall of said selected portion and having a selected partial pressure,

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irradiating said gas with electromagnetic radiation having a frequency selected to be substantially equal to electron cyclotron frequency at said selected magnetic field strength so as to ionize said gas and create a plasma zone within said selected portion, said plasma treating said wall of the lumen.

34. The method of claim 33, wherein the strength of said magnetic field is selected to be in a range of approximately 300 Gauss to 5500 Gauss.

35. The method of claim 34, wherein the frequency of the electromagnetic radiation is selected to be in a range of about 1 GHz to 15 GHz.

36. The method of claim 33, further comprising exposing the selected portion of the lumen to the plasma for a pre-defined time period in order to effect a selected treatment of the lumen.

37. The method of claim 36, wherein the pre-defined time period is in a range from about one second to about one minute.

38. The method of claim 37, wherein the selected treatment is any of smoothing or sealing the lumen wall.

39. The method of claim 37, wherein the selected treatment effects any of reducing friction, sterilizing, or bond scission of the lumen wall.

40. An apparatus for treating a surface of a tubular article, comprising

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a magnet for producing a static magnetic field within a region of space, said magnetic field having a selected amplitude,

a conduit adapted to couple to a source of gas to deliver a selected quantity of gas into at least a portion of said region of space in which the surface to be treated is placed, and

an electromagnetic-energy generator positioned so as to irradiate said region of space with electromagnetic radiation having a frequency substantially equal to an electron cyclotron frequency at said magnetic field magnitude so as to ionize said gas and create a plasma, said plasma treating the surface of the lumen.

41. The apparatus of claim 40, wherein said magnet is an electromagnet.

42. The apparatus of claim 40, wherein said electromagnetic-energy generator is a microwave oscillator.

43. The apparatus of claim 42, wherein said microwave oscillator is any of a magnetron or an IMPATT diode.

44. The apparatus of claim 42, further comprising a waveguide that transmits the electromagnetic radiation from the oscillator to the region of space.

45. The apparatus of claim 44, further comprising a horn attached to an end of said waveguide in proximity of said region of space, said horn providing an impedance match for efficient transmission of said radiation from said waveguide to said region of space.

46. The apparatus of claim 40, wherein said magnetic field amplitude is in a range of about 300 to about 5500 Gauss.

47. The apparatus of claim 46, wherein the radiation frequency is in a range of about 1 GHz to about 15 GHz.

48. An apparatus for treating a surface of a tubular article , comprising:

a magnet for producing a static magnetic field within a selected region of space forming a treatment zone, said magnetic field having a selected amplitude,

a waveguide section configured for connection to a source of microwave radiation, said waveguide section having two windows forming, in combination with the wall of the waveguide, an enclosure for storing a gas within the treatment zone, said windows being substantially transparent to the microwave radiation such that said source provides electromagnetic radiation within said enclosure having a selected frequency,

at least one port for allowing insertion of a portion of the tubular article into said gas enclosure,

wherein said radiation has a frequency substantially equal to electron resonance frequency at said selected amplitude of the magnetic field to ionize said gas and create a discharge within the treatment zone, said plasma being in contact with a selected surface of the tubular article to treat said surface.

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